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ABSTRACT

This paper investigates high school students' reactions to the science theater play "Mapping the Soul," which was developed by the Museum of Science in Boston, Massachusetts. Science theater is both an educational technique and a type of museum theater. This study explores these questions: (1) Do students differentiate learning science from science theater as compared to a traditional science class? (2) How are specific theatrical techniques--namely conflict between characters and audience participation--perceived by the audience? (3) After seeing a production of "Mapping the Soul," to what extent are students able to reason about the social, moral, and/or ethical implications related to the Human Genome Project? (YDS)

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by
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SCIENCE THEATER AS AN INTERPRETIVE TECHNIQUE IN A SCIENCE MUSEUM

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Science Theater as type of museum theater and a form of museum interpretation is becoming increasingly popular. Theater proponents see museum theater as a way of linking scientific concepts with their human contexts, and presenting complex and potentially controversial issues in an understandable and multifaceted way. Theater has been used in a wide range of applications by an equally wide range of museums, zoos, and aquaria (Hughes, 1998). Productions may involve one actor in a museumís galleries, to a fully staged performance. While necessarily linked to the museumís mission and educational goals, the actual performances may take place at the museum, or at schools and other off-site venues.

While museum theater is an established educational technique, there are few published research or evaluation reports. Most articles that have been written on the subject present an overview, justification, history, or case-study of museum theater rather than presenting research findings. A report about museum theater was published by the London Science Museum as a detailed evaluation (Bicknell & Xerxes, 1993), as well as a summarized report (Bicknell & Fisher, 1993). The American Association of Museums publishes a reprint package (American Association of Museums, 1993) that includes reports on evaluation projects conducted at the National Museum of American History, Canadian Museum of Civilization, as well as a number of more general articles and a reading list. A few overviews of the museum theater field have been published (American Association of Museums and International Museum Theater Alliance, 1993; Hughes, 1998), which also contain summaries of a number of internal evaluations at the Boston Museum of Science and other institutions. The other museum theater studies remain as unpublished internal evaluations undertaken by various museums.

This study summarized in this paper investigates high school studentsí reactions to the Science Theater play, *Mapping the Soul* , developed by the Museum of Science in Boston, Massachusetts. The goal of the study is firstly to provide information applicable for future museum theater productions and secondly to provide evidence supporting, or not supporting, the success of *Mapping the Soul* in meeting its goals as museum theater. This paper will focus on three of the research questions explored in the study.

- Do students differentiate learning science from science theater as compared to a traditional science class? If so, how do they describe the differences?

- How are specific theatrical techniques, namely conflict between characters and audience participation, perceived by the audience?

- After seeing a production of *Mapping the Soul* , to what extent are students able to reason about the social, moral, and/or ethical implications related to the Human Genome Project?

Project Background

Mapping the Soul , the focus of this study, is a 30 minute, two character play that centers on the scientific and social implications of the Human Genome Project. The play is a drama between a husband and a wife, and their connections to, and concerns about, the Human Genome Project.

In 1993, with support from the New England Regional Genetics Group (NERGG) and funding from the department of health and Human Services, the Museum of Science commissioned a professional playwright, to write the script for *Mapping the Soul* . In addition to a formative audience evaluation of the play (Baum, 1993), the script was reviewed by museum staff and an advisory committee appointed by NERGG in order to verify scientific issues and look for potential imbalances in the presentation. Since its creation, *Mapping the Soul* has been performed regularly as part of the Science Theater repertoire at the Museum of Science, with performances for the visiting public and for school groups both at the museum and at schools.

In 1997 the Museum of Science received funding from the Hughes Foundation to develop a new play focusing on the topic of biotechnology for a high school aged audience. As part of this project, funds were earmarked for an evaluation of *Mapping the Soul* , with the goal of helping to inform development of new the new production.

Methods

Several overlapping methods were used to collect and analyze data for this study. These methods include, interviews with students, pre-performance and post-performance surveys, and observations at performances. This study explicitly looks to the audience for their view, and seeks to report a summary of these views. In-other-words, all data, with the exception of observations by the researchers, is based on audience self-reports. This study is not meant to verify these self-reports, but rather to report on the common themes within responses given by the students.

Design of Instruments

The instruments used to collect data in this study include a student pre-performance survey, student post-performance surveys (versions A and B), and a student interview protocol.

The design of the instruments began with the researchers observing performances of the play, paying close attention to audience behavior. Pilot versions of the surveys were developed based on questions arising from these initial observations and discussions and collaborations with Museum of Science staff members. A pilot survey was administered to two groups of students watching the play at the Museum of Science. Based on this experience, questions were refined for the final instruments.

The short pre-performance survey was designed to gain initial information about the audience, in particular, studentsí experiences with genetics and knowledge of the Human Genome Project, and their experiences with theater.

The post-performance survey consists mainly of open-ended questions. Several of the questions include a specific passage from the playís script and ask students to respond directly to that portion of the play. Other questions ask students to react to or describe the play in general. Due to the number and complexity of questions, the post-performance survey was

divided into two versions, with some questions appearing only on version A, some only on version B, and some on both A and B versions.

The interview protocol was designed to verify and expand upon the findings of the student surveys. Similar to the post-performance survey questions, some questions asked that students read a passage from the playís script and then discuss that portion of the play, while other questions asked students to react to the play in general.

Implementation of Study

From February to May of 1998, 745 students from 11 high schools and 2 upper-middle schools attended performances of the play *Mapping the Soul* and participated in this evaluation (this is in addition to the schools participating in the pilot stage of the study). Performances were held either at the Museum of Science or at the schools.

The Science Theater staff scheduled the performances. A performance, for up to 100 students, was offered free of charge to teachers, provided they agreed to participate in the evaluation study. Teachers had the option of attending the play at the museum or at their school. School groups who viewed the play at the Museum of Science also received free admission to the museum.

At the start of each performance, students were asked to complete a pre-performance survey. This survey took approximately 5 minutes for students to complete. After the conclusion of the play, students were randomly given version A or version B of the post-performance survey. The post-performance surveys took approximately 15 to 20 minutes to complete.

During the time most students were working on the post-performance surveys, the researcher interviewed two to three students. These students were chosen ahead of time by the lead-teacher. The lead-teacher was asked by a researcher to choose students who best represented the audience (not necessarily the "best" students). These group interviews took approximately 15 to 20 minutes and were recorded on a tape recorder.

Further data came from the researchersí written observations during the performances -- observations of both the audience and of the performance. There was no set protocol for what was recorded as part of these observations.

Analysis of Survey Data

In order to analyze answers provided in the open ended survey questions, the researchers developed common themes -- or response categories -- with which to code individual answers. These categories were developed by reading over all the answers given by several classes of students to the same question. A description of each response category was developed by the researchers. Afterwards, a code number was given to each category. This process was employed for each question on the surveys, providing every question with its own set of coded response categories.

Subsequently, the researchers worked collaboratively to read through the answers written by all students and determined what codes should be given to each studentís answers. Since a studentís answer to one survey question might include several thoughts, in many cases one answer would receive several codes. Answers that did not seem to fit into any common category were coded as "other," and the number of students leaving a question blank was also recorded. In cases where one researcher was unsure of how to code a response, the answer was discussed by both researchers before being assigned a code.

After coding the survey questions, the codes were entered into an Excel spread sheet for analyses. The frequency of response for each code was calculated for every question. When warranted by the research questions, calculations were also made to find the frequency of

response for each code by sex or by venue (viewing play at school or at Museum of Science). When appropriate, t-tests for independence were used to compare the raw mean scores, or chi-square tests for independence were used to compare percentage scores. Only those comparisons showing significant differences are reported in this paper.

Analysis of Interview Data

After each performance, the cassette tape of the interview was given to the Museum of Science to be transcribed by volunteers to the Science Theater program. After each interview had been transcribed, the researchers coded the interview transcripts using the same codes developed for the surveys. In three cases, technical or scheduling difficulties made transcribing impossible, leaving interview data from ten schools.

Findings

Characteristics of Audience

Overall, 13 schools and performances were part of the study. Participating schools represented a diversity of communities from the greater Boston area.[1] Of the 13 performances, 4 took place at the Museum of Science (totaling 231 students) and 9 took place at schools (totaling 514 students). A total of 745 students completed the post-performance surveys, approximately equally divided between survey A (n=369) and survey B (n=376).

Due to the fact that one of the participating schools was an all-girls school, more girls (430) than boys (315) participated in the study. Studentsí ranged from grades 6 to 12, with the majority of students being in grades 9 and 10.[2]

Since most of the participating schools reportedly used the play to supplement a science curriculum that included the topic of genetics, it is not surprising that most students (82%) reported having studied some aspect of genetics or biotechnology previous to the play. However, only 41% of the students reported having heard specifically of the Human Genome Project.

Most students (90%) reported having had some previous experience with theater; either being in, or having had watched, a play.

Theater as a Science Education Venue

Most students understood the play as one way to educate, inform, or teach science, but also clearly indicated that they preferred the theatrical medium to their view of a science class. As one student commented in an interview, ". . . the play is more to our liking."

The highest coded category to the post-performance survey question *Why do you think the Museum of Science does plays?* stated that such plays are a way to educate, inform, or to teach science (46%). Whereas only 3% of answers mentioned the play was entertaining or fun without also mentioning an educational value. In-other-words, museum theater was seen as an educational, rather than purely entertaining media.

Many students answered the above mentioned question with an implied comparison between theater and more traditional educational venues. Generally positive in tone, these answers fell into a range of different categories. Only one category, "makes topics interesting/less boring" (11%) exceeded ten percent. The three next categories were, to entertain and inform (8%); makes it easier to understand (6%); and, to get the sense of real life or the practice of science (6%). Only 2% of students left the question blank.

These findings are supported by a second post-performance survey question that specifically asked for a comparison, namely: *How is learning from a play different than learning in science class?* In response to this survey question, only 5% of the responses stated that there was no difference between learning from Science Theater and a science class. The seven most frequently coded categories to this question were: a play is more interesting (28%); a play is entertaining (21%); a play gives a sense of real life (15%); a play is easier to understand (9%); there is audience involvement in a play (6%); a play is emotionally engaging (2%); and, a play has a story-line (1%).

Studentsí interviews elaborated on the survey findings, with students frequently discussing the value of the story-line in the play, the human context of the play, and the incorporation of "real" people and situations. The interviews suggest that students found the play useful for learning because it helped to put scientific topics in the context of human lives and emotions, which reportedly helped students relate to the topics.

> **S: Well, when you put on a play, it is more . . . in a context, so I think they [plays] are a good way to present an idea. . . . it is hard to project the emotions when you are giving a presentation. In a play you can express yourself, like the way you walk, the way you talk, tone, what you say. You get the whole picture, not just words, not just monotone . . . (Interview: April 30, 1998)**

Student interviews suggest that students find a play useful for learning because the play is based on "real life" or an everyday setting and uses everyday language, which makes the topic presented easier to understand.

> **S_1: The actors, they use regular, everyday situations and they talk casually. It is not like in presentations where you have to spew out a bunch of information that people donít even understand, I guess that is what makes an audience kind-of bored. But in a play, that brings them in.**
>
> **I: So the everyday aspect brings them in?**
>
> **S_1: Yeah.**
>
> **S_2: You can see yourself in that kind of conversation. You can see yourself at home having an ethics conversation with your husband. It is something you can see yourself doing. (Interview: March 5, 1998)**
>
> **S_1: The plays are kind-of-like books and the presentations are like encyclopedias because they just give you information and it is like Uhhhg! To much information! I guess the play is more to our liking.**
>
> **I: Do you think there was information in the play?**
>
> **S_1: There was a lot of information in the play but it came out of their conversations, they didnít just give it to you.**
>
> **I: How do you feel about the play verses other ways of learning science?**
>
> **S_2: I like it. I like it better than presentations. His analogy with the encyclopedia was really clear. You can read books and there is a lot of information in it, but there is also a lot of action in it and it makes you like it. (Interview: March 5, 1998)**

In the interviews, many students focused on the presence of a story-line in the play and

discussed its usefulness.

> **S: Well just because it adds like a story-line to it [the play], it kind of has more interest. A lecture is just facts. The same way like a story can have a moral that teaches you a lesson and it will give you a story that is fun plus the lesson that you learn with the moral. I think it is the same idea. (Interview: March 6, 1998)**
>
> **S: That [the play] is different than . . . in class. Thatís [the class] like facts and this [the play] like a story almost.**
>
> **I: How is it more like a story?**
>
> **S: Well it is like opinions and different people are saying stuff . . . you wouldnít think there is a script really. And they just sit there and talk about stuff. But when I am in class, teachers sometimes use a book and they just have facts written down on paper. (Interview: March 31, 1998)**
>
> **I: You mentioned that it helped you concentrate. How might a play help you concentrate more than a class?**
>
> **S: The story and real people. The science class doesnít necessarily have this. (Interview: March 6, 1998)**

Conflict Between Characters

One technique used in this theater production is the use of conflict, or argument, between the two characters. At the start of the play, one character, Gus, lauds the medical and scientific triumphs of the Human Genome Project, while the other character, Charlotte, presents a series of moral and ethical issues the project raises. During the play the husband and wife discuss, argue, and to some extent, come to appreciate each otherís views. A segment of the script, portraying an example of conflict between the two characters, follows.

> **Charlotte: Thatís just what my boss says. What does he care if thereís a war between my company and my DNA.**
>
> **Gus: Hey, maybe <u>you</u> should quit, not me. I mean if you donít like the policies . . .**
>
> **Charlotte: Iím going to change the policies. What are you going to do, Gus?**
>
> **Gus: Iím going to go to work. Just because there are kinks in our public policy, doesnít mean we stop research.**

Findings from this study indicate that the final script achieves a notable degree of balance between the two characters, as both characters were perceived as credible to students. On a post-performance survey, when asked *Throughout the entire play, did you think what each character said was true?* most students (76%) indicated that they thought both characters had true arguments. Fifty-nine percent of students whose answers elaborated on the same question said that the charactersí believability was due to the charactersí "good reasons" or command of "facts and research."

The fact that students perceived both characters as providing credible arguments did not mean they necessarily <u>agreed</u> with both points of view equally. On a post-performance survey, when asked *Throughout the entire play, did you tend to agree with one character more than the other?* 67% of students stated they agreed with both characters equally. The remaining students favored one or the other of the characters with agreement being fairly equally split between Gus and Charlotte

There was, however, a statistically significant difference between the male and female students who

favored one character over the other $x^2(2,n = 369) = 17.2$, $p<.005$. Students tended to agree with the character of their same sex more often. Female students were more likely to agree with the female character, Charlotte more often (33%) and the male character Gus less often (10%), while male students were more likely to agree with the male character Gus more often (28%) and the female character Charlotte less often (13%).

A third post-performance survey question asked of students *How did these conflicts or arguments make you feel about the characters?* Answers were coded and grouped into categories of reflecting either negatively or positively on the play or characters. Approximately half of the students (47%) answered that such arguments reflected positively on the characters or play, while 28% answered that the arguments reflected negatively. Further, there was a significant difference between male and female students who perceived the arguments as reflecting positively or negatively on just one character $x^2(2, n = 369) = 8$, $p<.025$. More male students found the arguments negatively reflected on the character Charlotte (9%) or positively reflected on the character Gus (4%), while more female students found the arguments negatively reflected on the character Gus (11%) or positively reflected on the character Charlotte (6%).

Students interviews corroborated the survey results, in that students found the theatrical technique of conflict helpful in understanding the different sides of the topic, rather than seeing the presentation as one-sided. Likewise, the arguments were seen more as realistic parts of life than reflecting negatively on the characters or their relationship.

> I: How did these conflicts make you feel about the characters?
>
> S: That they were real, that they both agreed on some things.
>
> I: Being real meaning realistically you could see this happening?
>
> S: No, I mean it also gave you two different perspectives. It gave you a side of each and which would help you choose. I mean you didnít get one side of the argument. Having them argue gave you two sides. (Interview: April 9, 1998)
>
> S: It got me thinking what they were arguing about. Because it like brought more opinion and feeling into [the play] than if they were just sitting there talking. (Interview: March 31, 1998)
>
> I: Did you think their arguments were a turn off, or were they helpful to you?
>
> S: Helpful . . . towards the end you can kind-of relate more to one of the characters but you need that contrast. You need the opposite character to kind-of keep you thinking, to keep you coming back with a thought, developing a case. (Interview: April 30, 1998)

Audience Participation

Another technique employed in this production was audience participation. Twice during the play the actors stopped and asked the students to participate in a discussion about the dilemmas in the play. A segment of the script, portraying the introduction of audience participation, follows.

> **Charlotte:** Then suddenly thereís a genetic test for Huntingtonís Disease.
>
> **Gus:** In 1986, a genetic marker for the disease was identified, and recently the gene itself was discovered.
>
> **Charlotte:** And you now have the chance of finding out with some degree of certainty what your fate may be. What would you do?

Gus: What would you do, she asked me. Well, since 1986, only a small percentage of the people at risk have requested testing. So we ask you: what would you do? Do you have the test? Or live with the uncertainty?

Most students reportedly did not participate in these discussions. On a post-performance survey question, when asked *Did you answer the question or participate in the conversation?* only 25% of the students reported answering a question or joining in the discussion, while 72% did not. Of the studentsí answers that elaborated on reasons for not joining the discussion, the five most frequently coded responses were: feeling too shy to speak in front of a group (25%), not feeling they had enough information about the topic to participate (12%); not wanting to answer (11%); liking to hear othersí views (8%); and someone else already having answered the question (4%).

Although most students did not directly participate in the discussion, the majority of students reported feeling positive about the technique of audience participation. Studentsí answers to the post-performance survey question, *What did you think or feel when the actors stopped the play and asked you to join them in a discussion?* were coded as either positive or negative. Sixty-four percent of students responded positively while only 14% of the students responded negatively.

Student interviews suggest that students appreciated the technique of audience participation because they liked being involved, or included, in the play and discussion.

I: What do you think was the most memorable part of the play? What sticks in your mind the most?

S: I think when they are talking to the audience and like included us. I thought that was a good idea. (Interview: April 30, 1998)

I: What do you think about that [audience participation]?

S: I thought it was pretty good trying to get everybody involved.

I: Yeah?

S: Trying to think about what they [the audience] thinks also. (Interview: March 31, 1998).

In addition, student interviews suggest that the technique of audience involvement helped students to better understand, and gain a wider perspective of, the topic. In particular, students reported that they found it useful to hear the opinions of their classmates.

S: I thought it was just going to be a play. But it was a little bit better because it got the audience involved.

I: So you liked the audience involvement?

S: Yes, it was like their consciousness that was discussing. I like that part. (Interview: March 18, 1998)

I: What was the most memorable part about the play?

S_1: I think what other peoplesí opinions were when they did the discussions. I really concentrated on what other people were saying that were in the group. I could relate to them, I go to school with them and some of them were in my class. I think that is what I remember the most.

I: Why do you think it might have been important to hear your colleagues, your peersí, opinions?

S_1: Well, just to get other peopleís points of view . . . it just gave me more of a chance to understand where other people are coming from and why they would think what they are thinking.

S_2: [For example,] when the actor said that she wanted to be tested, I first said, oh definitely not, but then when I heard everybody else and I kind-of decided that I actually wanted to be. (Interview: April 9, 1998)

I: We talked a little bit about why you thought it [audience participation] was useful.

S_1: Because it helps me get to other points of view.

I: Is there anything else?

S_1: It makes you wonder about your opinion more.

S_2: It makes you wonder and see what other people think. (Interview: April 9, 1998)

Finally, some student interviews elaborated on why a student might choose not to participate in such a discussion.

S: I found it comfortable because our class had some sort of background information before hand. . . . Like I know I wouldnít [participate in the discussion] if Iím shaky about something. Iím not going to announce it to all the kids. I have to be pretty solid. (Interview: April 30, 1998)

Ability to Reason

One question this study asked was whether the play might have an impact on studentsí ability to reason about the social, moral, and/or ethical implications of a scientific topic, the Human Genome Project.

Prior to the play, when asked the question, *If you have ever heard of it [the Human Genome Project], do you think it could affect your life or the lives of the people you care about? Explain your answer.* only 28% of the students provided any answer articulating how the Human Genome Project might, or might not, affect their lives or the lives of others, while 72% of the students simply left the question blank. Contributing to this was the fact that 61% of students had already stated that they had never heard of the Human Genome Project before arriving for the play.

The above mention question, was repeated nearly verbatim on a post-performance survey, *In what ways, if any, do you think the Human Genome Project could affect your life or the lives of people you care about?* After the play, when asked the question, 87% of the students were able to provide an answer articulating how the Human Genome Project might affect their lives and the lives of others (a 59% increase from pre-performance to post-performance). In addition, in the post-performance question, 3% of the students stated that the Human Genome Project would have no effect, and 4% of the students stated they were not sure. Only 6% of the students left the question blank on the post-performance survey.

Of the 87% of students who provided an answer to the post-performance question, 32% reported that the Human Genome Project would directly affect their lives or the lives of

immediate family members, while 61% reported that the Human Genome Project would have more general effects on society. Frequent responses to this question include: the Human Genome Project will help cure or prevent disease or suffering (23%); the Human Genome Project will provide advanced knowledge about a genetic predisposition (18%); and, reference to the Human Genome Project resulting in discrimination or lack of privacy (17%).

Interviews with students reinforced the finding that after seeing the play, students were able to reason about the impacts of the Human Genome Project. Students often drew connections between the Human Genome Project and their own lives and experiences.

I: Do you think this project has a potential impact on you or people you care about?

S_1: . . . I guess it kind-of does, you know, if I could relate to it, but not now.

I: So you donít see any immediate impact?

S_1: No.

S_2: I do, because if like cancer runs in the family, then you might want to know if you are at risk to get it, or take precautions to try to avert it and stuff.

I: So that is a situation that you could see potentially affecting you or someone you know.

S_2: Yeah.

S_1: I donít know, I know that diabetes runs in my family. Like my father has it and everybody else in his family, but it also skipped one or two brothers so it could just skip me. I donít even want to know. If Iím prone to get it then Iíll just get it, but it wonít change anything. (Interview: April 3, 1998)

S_1: Well a point that I would bring up about that is my Momís friend had at the time knew about that. In her situation, her brother, had the disease and she didnít know if she had it and the only way she thought that they could stop the disease was to not have kids because she had the genes. So she went on and she didnít have any kids. And then when they got a test and she got tested she never had the genes and she really wanted kids. I think that is a really important part because if you do have the genes, then for your kids it could be dangerous. If you donít have the disease, but you do have the genes.

I: So you had an experience that you could relate to this.

S_2: That is why I disagree with her, why you should know, it is not that you should or should not because if you should know, if you do know then you will just wait until you die, and you wonít do nothing much. I got a couple years left so if I bang my head against the desk then I might die right away. But if you donít know, then you could take risks, and if you do die you wonít know it because you are dead. (Interview: March 6, 1998)

S_1: If I knew I was going to have breast cancer or cancer of some sort, I definitely would want to know.

S_2: There could be something that could change your life.

S_3: Even if you donít want to know, everything is going to happen to you and change anyway. It is going to be worse.

S_1: If I knew my chances of getting breast cancer were high, Iíd go to all the appointments and even every six months. And it is just different, because if I know I have something, it is going to change my life. It might be for the worse, but I think I could change things for the better. If when you get involved with someone, if you want to get closely involved with that person, that person should know also, that they are getting involved with a person that might die. (Interview: March 5, 1998)

Discussion

This evaluation study provides strong support that the play, *Mapping the Soul* has achieved many of the goals of museum theater. It introduced a complex issue in a way that was balanced, thought provoking, and initiated studentsí ability to link together complex scientific and moral issues to personal and societal matters. These findings have implications for future museum theater productions, as well as for educators interested in presenting controversial issues and/or scientific issues in a relevant and engaging way.

Indeed students found their experience of learning from a play to be different than learning from a traditional science class. In particular, students reported that the play contextualized a topic in the way that a classroom typically does not, helping the students make a personal connection to the topic. In addition, the story-line offered by the play reportedly helped students put the topic into a human context, which for many students makes the topic easier to understand and focus on. The story-line and plot, although including sophisticated terminology, allowed students to understand the topic in a very accessible manner, as was observed when students referred to the conversations and interactions of the characters being "understandable," and even "casual."

The technique of conflict or argument, employed by this Science Theater production helped to present a multi-sided view of the benefits and concerns raised by the Human Genome Project. Students did not seem particularly turned off or offended by the arguments, rather most saw the arguments as adding to the realism of the play. However, a significant number of students agreed more the with character of their same sex. This would seem to be an important factor to consider in the writing, casting and evaluation of future plays for audiences of this age group (and likely other age groups). If a balanced argument is desired, who makes an argument may be an important factor, not just what argument is made.

Although only one quarter of students reported participating in the interactive portions of the play, the majority of students felt positive about this technique. In particular students found the technique useful in helping them to organize their thoughts, and to gain awareness of their peersí understanding, allowing them to become aware of a variety of ways to understand the topic. This finding supports the use of this technique in future museum theater productions, though strategies that encourage more studentsí participation should be explored.

Perhaps most importantly, the findings show that students were able to successfully reason about the social, moral, and ethical issues presented in this play. The findings of this study begin to demonstrate how museum theater is a useful medium capable of interpreting a complex and multi-sided issue, and of linking the human dimensions to a scientific issue.

Notes

[1] Description of participating schools, as self-reported by teachers, are as follows:

ï multi-cultural, urban campus

ï large multi-cultural, inner-city school

ï white, middle- to upper-middle class

ï small Catholic high school, kids from low to moderate income families

ï working class, suburban

ï 72% White, 8% Black, 15% Hispanic, 5% Other

ï urban/minority

ï Jewish Day school

ï suburban upper-middle class, predominantly white

ï all girls, college-prep, international boarding and day school

ï school to work, work study, etc.

ï urban

[2] Number of students per grade: grade 6 (n=16); grade 7 (n=13); grade 8 (n=10); grade 9 (n=366); grade 10 (n=200); grade 11 (n=69); and, grade 12 (n=70).

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